

TITLE OF THE INVENTION

VOICE RECORDING AND REPRODUCING APPARATUS, INFORMATION
PROCESSING APPARATUS, AND RECORDING MEDIUM HAVING
RECORDED AN INFORMATION PROCESSING PROGRAM

5 CROSS-REFERENCE TO THE RELATED APPLICATIONS

This application is based upon and claims the
benefit of priority from the prior Japanese Patent
Application No. 2000-022752, filed January 31, 2000,
the entire contents of which are incorporated herein by
10 reference.

BACKGROUND OF THE INVENTION

The present invention relates to a voice recording
and reproducing apparatus digitizing inputted voice and
recording them in a recording medium, an information
15 processing apparatus being connectable to such a voice
recording and reproducing apparatus, and a recording
medium having recorded an information processing
program causing a computer to function as such an
information processing apparatus.

20 Generally, the voice recording and reproducing
apparatus, that is, the tape recorder has an
application in dictation recording. In this dictation
recording the tape recorder is used in various ways,
for example, the content of a letter to be sent is
25 recorded on an audio tape by a tape recorder, this
audio tape is delivered to a secretary or the like, and
this secretary or the like plays back the tape, listens

to the voice and types the letter, or the content of a meeting is recorded and subsequently minutes of the meeting are taken by playing back the tape and listening to the recorded content.

5 And in recent years, in the voice recording and reproducing apparatus, due to demand for a miniaturized apparatus there have been developed apparatus using a semiconductor memory instead of a magnetic tape as a recording medium.

10 Among such voice recording and reproducing apparatus recording voice data in the semiconductor memory, there are some having a composition in which the semiconductor memory cannot be detached from the main body of the apparatus. In such an apparatus, when
15 desiring to deliver recorded voice data to a secretary or the like and to have a document typed, that is, when desiring to use voice data recorded in this semiconductor memory in an external apparatus such as a voice reproducing apparatus other than the concerned
20 apparatus, the voice data is transmitted to the external apparatus via a cable connected between both apparatuses.

 Here, since personal computers (PCs) are widely applied recently, documents are usually typed by a word
25 processor operating on this PC. Generally this PC is equipped with a sound function and is capable of reproducing and outputting voice data by a speaker

connected thereto. Therefore, a method of transmitting
recorded data from the voice data recording and
reproducing apparatus to the PC and type-inputting the
voice data by a word processor with reproducing them on
5 the PC is now used.

And recently, PCs having employed an interface
specification permitting connection of many devices
called USB (Universal Serial Bus) based upon a so-
called Plug and Play function are widely applied.

10 By the way, in a voice recording and reproducing
apparatus using a semiconductor memory as described
above as a recording medium, when voice data are
recorded, they are recorded in the semiconductor memory
as a voice data file to which header information has
15 been added. This header information includes many
kinds of information such as information for
identifying the recorder of the voice data and the
typist, recording mode, recording date and the like.

With respect to information which the operator can
20 set optionally among this header information, since the
voice recording and reproducing apparatus is provided
with only several operating buttons, it is required to
select and designate such information from a
hierarchically structured menu, what is very
25 complicated and is liable to lead to operational
failures.

BRIEF SUMMARY OF THE INVENTION

The present invention has been made in consideration of the above-described circumstances and has an object of providing a voice recording and reproducing apparatus being capable of setting each
5 information of the voice recording and reproducing apparatus by enabling the information processing apparatus such as a PC or the like to set each information, an information processing apparatus, and a
10 recording medium having recorded an information processing program.

According to a first aspect of the present invention, there is provided a voice recording and reproducing apparatus, comprising:

15 conversion means for converting inputted voice signals into digitized voice data;

header information storage means for storing header information;

20 recording means for adding header information stored in the header information storage means to the voice data converted by the conversion means and for recording the voice data in voice data recording means; and

changing means for communicating with an external
25 apparatus and for changing header information stored in the header information storage means based upon information sent from the external apparatus.

According to a second aspect of the present invention, there is provided an information processing apparatus connectable to a voice recording and reproducing apparatus for digitizing and recording
5 inputted voice signals in a recording medium, comprising:

inherent information acquisition means for acquiring the inherent information of the voice recording and reproducing apparatus; and
10 control means for carrying out controls in accordance with the inherent information acquired by the inherent information acquisition means so that at least one of the control program and the control data of the voice recording and reproducing apparatus may be
15 changed.

According to a third aspect of the present invention, there is provided a recording medium having recorded an information processing program, the information processing program comprising:

20 a processing program for causing a computer connectable to a voice recording and reproducing apparatus digitizing inputted voice signals and recording in a recording medium to acquire the inherent information of the voice recording and reproducing
25 apparatus; and

a processing program for changing at least one of the control program and the control data of the voice

recording and reproducing apparatus according to the inherent information.

Additional objects and advantages of the invention will be set forth in the description which follows, and in part will be obvious from the description, or may be learned by practice of the invention. The objects and advantages of the invention may be realized and obtained by means of the instrumentalities and combinations particularly pointed out hereinafter.

10 BRIEF DESCRIPTION OF THE SEVERAL VIEWS OF THE DRAWING

The accompanying drawings, which are incorporated in and constitute a part of the specification, illustrate presently preferred embodiments of the invention, and together with the general description given above and the detailed description of the preferred embodiments given below, serve to explain the principles of the invention.

FIG. 1 is a view showing the composition of one embodiment of the present invention;

20 FIG. 2 is a view showing the content of header information stored in the data table;

FIG. 3 is a view showing the content of data recorded in the header portion of the voice data file;

25 FIG. 4 is a flowchart of a connection routine executed in the PC;

FIG. 5 is a flowchart of a connection confirmation and data table creation subroutine;

FIG. 6 is a flowchart of a control switching (parameter setting) subroutine in FIG. 4;

FIG. 7 is a view showing the content of data transferred from the PC to the voice data recording and reproducing apparatus;

FIG. 8 is a flowchart of a main routine executed in the system control portion of the voice data recording and reproducing apparatus; and

FIG. 9 is a flowchart of a connection processing subroutine in FIG. 8.

DETAILED DESCRIPTION OF THE INVENTION

Now, referring to the drawing, one embodiment of the present invention will be described.

In FIG. 1, as one embodiment of an information processing apparatus to which a plurality of voice recording and reproducing apparatus are connectable and which can exchange data with the voice recording and reproducing apparatus, a personal computer (PC) 10 is shown. Further, as one embodiment of one of the voice recording and reproducing apparatus composed as a plurality of USB device connected to the PC 10, a voice data recording and reproducing apparatus 20 is shown.

Here, in the voice data recording and reproducing apparatus 20, a microphone (MIC) 21 is connected to a system control portion 25 via an amplifier (AMP) 22, a low-pass filter (LPF) and an analog/digital converter 24.

Although not shown in particular, this system control portion 25 contains a digital signal processing portion (DSP) as an encoding/decoding circuit for compressing/expanding voice data and a CPU for
5 controlling each portion of the voice data recording and reproducing apparatus 20. Further, this system control portion 25 contains a data table 25A composed of a rewritable nonvolatile recording medium such as an EEPROM having stored various information such as a type
10 name for identifying the voice data recording and reproducing apparatus and header information as described below.

To this system control portion 25 a nonvolatile semiconductor memory 26 as a recording medium for
15 recording voice data and a power source control portion 27 are connected. Moreover, to this system control portion 25 a speaker 31 is connected via a digital/analog (D/A) converter 28, a LFP 29 and a power AMP 30.

20 Further, to this system control portion 25 a operational input portion 32 is connected. Although not shown in particular, operational input portion 32 includes a playback button, a fast-forward button, a rewind button, an I-mark button, an E-mark button, an
25 endless recording switching button and the like in addition to the record button REC and the stop button STOP.

Here, the I-mark and the E-mark are as described below. That is, since a plurality of voice data are recorded in the semiconductor memory 26, in this kind of voice data recording and reproducing apparatus, a recorder can record an instruction (I) mark showing priority relations among a plurality of voice data recorded in the semiconductor memory 26, that is, an index mark for giving instructions to a typist or secretary, by operating the I-mark button in recording voice data. Accordingly, the recorder can instruct priority relations concretely by voice by using this I-mark. Moreover, the recorder can record an index mark called an end (E) mark by operating the E-mark button in order to show punctuations among a plurality of voice data.

Moreover, to the system control portion 25 a data conversion portion for data transfer 33 is connected in order to communicate with the PC 10 via an USB cable 40. This data conversion portion for data transfer 33 constitutes a means for receiving data from external apparatus such as a PC and the like, a means for sending a connection confirmation completion signal to external apparatus and a means for sending data. Moreover, the data conversion portion for data transfer 33 supplies a connection confirmation completion signal 34 to a terminal T1 of the system control portion 25 when the USB cable 40 has been connected.

That is, in the voice data recording and reproducing apparatus 20, analog signals obtained from the MIC 21 are amplified by the AMP 22 and passed through the LPF 23, and subsequently, they are
5 converted into digital signals by the A/D converter 24, inputted into the system control portion 25 and are encoded, and these encoded voice data are recorded in the semiconductor memory 26. At this time, header information recorded in the data table 25A is added to
10 voice data, and the voice data are recorded as a voice file.

Moreover, voice data recorded in the semiconductor memory 26 are read out and decoded by the system control portion 25, and these decoded read-out data are
15 inputted into the D/A converter 28 and converted into analog signals via the LPF 29. And the signals outputted from this LPF 29 are amplified by the power AMP 30 and outputted outside from the speaker 30 as sounds.

20 Further, the voice data recorded in the semiconductor memory 26 is read out by the system control portion 25, inputted into the data conversion portion for data transfer 33 and transferred to the PC 10 via the USB cable 40.

25 FIG. 2 is a view showing the content of header information stored in the data table 25A. That is, this data table 25A stores "Author ID", "Work Type ID",

"Option Item name", "Option Item ID" and the like.

Here, the "Author ID" is the ID or real name of an dictating user, and 10 items of data consisting of 16 bytes respectively can be registered in alphanumeric characters. Moreover, the "Work Type ID" is the ID or
5 real name of a job, and 10 items of data consisting of 16 bytes respectively can be registered in alphanumeric characters. "Option Item name" is the name of an item displayed on a display portion (not shown) of the voice
10 data recording and reproducing apparatus 20 as a menu, and one item of data consisting of 8 bytes is registered in alphanumeric characters. And the "Option Item ID" is the ID of an item which is different in each company, and one item of data consisting of
15 20 bytes is registered in alphanumeric characters.

For example, if used in a hospital, the "Author ID" will be allocated to the name of a doctor, the "Work Type ID" to the name of a department such as internal department, and the "Option Item ID" to the
20 health insurance number or the like.

Moreover, as described above, the header information recorded in the data table 25A is added to the voice data corresponding to the voice inputted from the MIC 21, and these voice data are recorded as a
25 voice data file in the semiconductor memory 26. Here, the header portion of the voice data file includes, as shown in FIG. 3, various data set by the user or

automatically. Further, in the same figure, the "INDEX
mark" corresponds to the I-mark, and the "Extended
INDEX mark" corresponds to the E-mark. Moreover, the
"Work Classification code" corresponds to the "Work
5 Type ID". Before being written in the file, these data
are stored suitably in the data table 25A.

Now, the operations of the PC 10 to which a
plurality of voice data recording and reproducing
apparatus 20 having the above-described structure can
10 be connected will be described.

That is, in the PC 10, when the control program of
this voice data recording and reproducing apparatus 20
is started, initial settings such as settings of screen
display, each parameter and the like are made. In
15 these initial settings, for setting each parameter, a
connection routine as shown in FIG. 4 is executed.
That is, in this connection routine, first, a
connection confirmation and data table creating
subroutine is called (Step S1). More specifically,
20 this subroutine is to identify all USB devices
connected to the PC 10 and to create a data table
showing the USB devices connected to the PC 10. And
subsequently, based upon the data table created by
means of this subroutine and stored in a RAM (not
25 shown), a control switching (parameter setting)
subroutine for the voice data recording and reproducing
apparatus 20 which is a desired USB device is called

(Step S2).

Here, the connection confirmation and data table
creating subroutine in the Step S1 is as shown in
FIG. 5. That is, first as the initial setting of a
5 connection number, the internal counter N (not shown)
is reset to "0" (Step S11). And subsequently, a
request for identification code transfer is sent to
the USB device having a connection number N shown in
this counter N (Step S12). And, for a predetermined
10 period of time, the system waits to receive data
(identification code) (Step S13). Here, it is judged
if the N-th USB device is connected accordingly as the
data have been received or not (Step S14), and if it is
not connected, this connection confirmation and data
15 table creating subroutine is terminated and the
procedure returns to an upper connection routine.

On the other hand, when it is judged that the N-th
USB device is connected, this connection number (number
N) and the received identification code are recorded
20 additionally in a data table created in the RAM
(not shown) in the PC 10 (Step S15). Here, the
identification code includes, for example, the model
name information of the USB device (the connected
device type, that is, the device type name) and the
25 user ID information (ID number, that is, the "Author
ID"). And "1" is added to the connection number N
shown in the counter N (Step S16), the procedure

returns to the Step S12, and the request for identification code transfer is sent to the next USB device.

5 By repeating the Steps S12 to S16, the list of all the connected USB device is created as a data table and stored in the RAM (not shown).

Further, in this embodiment, it is assumed that a connection number is allocated automatically from "0" sequentially to the devices connected to the PC 10.

10 Moreover, the control switching (parameter setting) subroutine in the Step S2 is as shown in FIG. 6. That is, first, the determination of the connected recorder is processed (Step 21). In this processing, by displaying the list of all the USB
15 device connected to the PC 10 recorded in the data table, that is, the list of the connection numbers, on the monitor and by receiving a connection number inputted by the operator, a voice data recording and reproducing apparatus (recorder) 20 which is an USB
20 device desired by the operator is selected.

And subsequently, a recorder identification code is acquired again from the device having the connection number selected and inputted by the operator, is compared with the corresponding recorder identification
25 code (connected device type and ID number) recorded in the data table and is confirmed (Step S22). In the connection confirmation and data table creating

subroutine, the connection-confirmed USB device may be disconnected or added lastly while it is being confirmed if USB device to be connected later than the connection-confirmed USB device are connected, and
5 therefore, this Step S22 is executed for confirming again if the connection-confirmed USB device is connected.

Next, it is judged if the operator of the PC 10 has carried out an operation for changing the ID number, that is, the "Author ID", in the USB device, in this case, in the voice data recording and reproducing apparatus 20 (Step S23). Here, if the operation for changing the ID number is not carried out, this control switching subroutine is terminated and the procedure
15 returns to an upper connection routine.

On the other hand, if the operation for changing the ID number is carried out, a request for data table change is sent to the voice data recording and reproducing apparatus 20, and a new ID number set by the operator is sent (Step S24). And, after the data table stored in the RAM (not shown) has been updated, that is, the identification code has been changed (Step S25), this control switching subroutine is terminated and the procedure returns to an upper connection
25 routine.

Further, for simplification, this control switching subroutine shows a processing for changing

the ID number only as a representative example, and it is without saying that various data of the voice data recording and reproducing apparatus 20 such as the "Work Type ID" and the like are also changed in this
5 subroutine.

For example, data as shown in FIG. 7 are transferred from the PC 10 to the voice data recording and reproducing apparatus 20, and the data in the data table 25A can be updated. That is, here, "Author Entry
10 Number" is the number of the registered "Author ID", and "Author IDn" is a 16-digit value of the n-th "Author ID". "Work Type Entry Number" is the number of the registered "Work Type ID", and "Work Type IDn" is a 16-digit value of the n-th "Work Type ID". And "Option
15 Item Name" is a 16-digit item name.

Moreover, the operator not only specifies, as in the Step S23, the transfer of these data optionally, but naturally these data may be also transferred automatically at the beginning of connection, thereby
20 updating the data in the data table 25A.

After completion of the initial settings, in the PC 10, when the main screen for controlling the voice data recording and reproducing apparatus 20 is displayed on the monitor and a file transfer processing
25 is instructed by mouse or keyboard input, the specified file is received from the voice recording and reproducing apparatus 20 via an USB cable 40. And,

when file reproduction is instructed, a file reproduction command is sent to the voice data recording and reproducing apparatus 20, and the specified file is reproduced in the voice data recording and reproducing apparatus 20. When recorder-recorded information confirmation is instructed, a number of records confirmation command is sent to the voice data recording and reproducing apparatus 20, and the number of records recorded in the semiconductor memory 26 and sent back from the voice data recording and reproducing apparatus 20 corresponding thereto is displayed on the monitor. Moreover, when PC time setting is instructed, a time setting command (including time data measured by a clock built in the PC) is sent to the voice data recording and reproducing apparatus 20, and the built-in clock is thereby synchronized with the PC time in the voice data recording and reproducing apparatus 20. When a recording processing is instructed, a recording processing command is sent to the voice data recording and reproducing apparatus 20, and voice data are thereby recorded in the semiconductor memory in the voice data recording and reproducing apparatus 20. And, when the termination of this control program is instructed, a command for switching the power source of the voice data recording and reproducing apparatus 20 to low power is sent to the voice data recording and

reproducing apparatus 20, and the voice data recording and reproducing apparatus 20 is thereby shifted to power-saving mode. Like this, the voice data recording and reproducing apparatus 20 can be controlled from the PC 10.

On the other hand, in the voice data recording and reproducing apparatus 20, the system control portion 25 operates like a main routine shown in FIG. 8.

That is, corresponding to the throw-in of the power source switch (not shown), an internal work memory, a register and the like (not shown) are first initialized (Step S31), and subsequently, it is judged whether any operating button of the operational input portion 32 has been operated or not (Step S32). And, when the record button REC is pushed (Step S33), the recording processing is executed (Step S34). When the playback button (not shown) is pushed (Step S35), a playback processing is executed (Step S36). Moreover, when the fast-forward button (not shown) is pushed (Step S37), a fast-forward processing is executed (Step S38). When the rewind button (not shown) is pushed (Step S39), a rewind processing is executed (Step S40). Since these recording processing, play back processing, fast-forward processing and rewind processing are the same as the conventional ones, the details thereof are omitted here.

Moreover, when it is judged in the Step S32 that

no operating buttons have been pushed, it is judged by the connection confirmation signal 34 from the data conversion portion for data transfer 33 whether the connector of the USB cable 40 is connected or not (Step S41). And, when the connector is not connected, the procedure returns to the Step S32. On the other hand, when the connector is connected, a connection processing subroutine is executed (Step S42).

This subroutine is executed as shown in FIG. 9. That is, first, it is judged whether there is a request for identification code transfer from the PC 10 or not (Step S42A). When the request for identification code transfer is received by the data conversion portion for data transfer 33 from the PC 10 via the USB cable 40 due to the processing in the Step S12, the judgment in this Step S42A becomes "YES". In this case, the system control portion 25 reads out a recorder identification code including the device type name, the "Author ID" and the like stored in the data table 25A in the system control portion 25 (Step S42B). And, after this read-out recorder identification code has been transferred to the PC 10 (Step S42C), the procedure returns to the Step S42A.

On the other hand, when it is judged in the Step S42A that there is no request for identification code transfer, it is further judged whether there is a request for data table change or not (Step S42D). When

the request for data table change is sent from the PC
10 via the USB cable 40 as in the processing in the
Step S24, it is received by the data conversion portion
for data transfer 33, and the judgment in this Step
5 S42D becomes "YES". In this case, the system control
portion 25 executes a data table change processing
(Step S42E). The details of this data table change
processing are omitted here, but in this processing
data sent after the request for data table change
10 are received and the data table 25A is updated.
Accordingly, this system control portion 25 functions
as a changing means. And, after completion of this
data table change processing, the procedure returns to
the Step S42A.

15 On the other hand, when no request for data table
change has been received in the Step S42D, it is judged
whether there is a request for remote control of the
voice data recording and reproducing apparatus 20 from
the PC 10 including voice recording, reproduction and
20 the like as described above or not, and a processing
corresponding thereto is executed. However, since this
is not a characteristic part of the present invention,
the illustration and description thereof are omitted.

And, when there are no control signals from the PC
25 10, it is further judged whether the connector is
disconnected or not (Step S42F). And, when the
connector is not disconnected, the procedure returns to

the Step S42A, and when the connector is disconnected, the procedure returns to an upper main routine.

As described above, in this embodiment, when a plurality of voice data recording and reproducing apparatus 20 being capable of transferring a recorder identification code including device type name and ID number to the PC 10 are connected, the concerned voice data recording and reproducing apparatus 20 is identified by the recorder identification code, and subsequently, the recorder identification code and the header information of the voice file can be updated.

Although the present invention has been described in one embodiment, it is to be understood that the present invention is not limited to the above-described one embodiment and that various modifications and applications may be made without departing from the scope of the summary of the present invention.

For example, having described the present invention as related to a voice data recording and reproducing apparatus recording and reproducing voice data as a voice recording and reproducing apparatus connected to an information processing apparatus, it is without saying that the present invention may be applied to apparatus recording and reproducing other data such as image data and the like. Moreover, it has been described that both apparatus are connected with each other by USB, however, the connection of both

apparatus is not limited thereto.

Further, in the above-described one embodiment,
the data table 25A of the voice data recording and
reproducing apparatus 20 is updated, however, it is
5 without saying that the header information of the voice
file stored in the semiconductor memory 26 may be
changed.

Moreover, it is also possible to rewrite the
control program of the system control portion 25 of the
10 voice data recording and reproducing apparatus 20 from
the PC 10.

Additional advantages and modifications will
readily occur to those skilled in the art. Therefore,
the invention in its broader aspects is not limited to
15 the specific details and representative embodiments
shown and described herein. Accordingly, various
modifications may be made without departing from the
spirit or scope of the general inventive concept as
defined by the appended claims and their equivalents.